REMARKS

This amendment is responsive to the final Office Action of February 2, 2011. Reconsideration and allowance of claims 4, 6-9, and 13-23 are requested.

The Office Action

Claims 1, 4, 6-9, 12-16, and 18-23 stand rejected under 35 U.S.C. § 103 over Front (US 2001/0041835) as modified by Etienne ("Soap-Bubble Visualization and Quantitative Analysis of 3D Coronary Magnetic Resonance Angiograms").

Claim 17 stands rejected under 35 U.S.C. § 103 over Front as modified by Etienne, as further modified by Du (US 6,268,730).

Claim 12 stands rejected under 35 U.S.C. § 112, second paragraph.

The Present Amendment Should Be Entered

The present amendment places dependent claims 4, 6, and 13 in independent form including the subject matter of their parent claims. Because a dependent claim is read as including all of the subject matter of its parent claim, placing a dependent claim in independent form does not raise issues that would require further search or consideration.

Moreover, as claim 13 was placed in independent form, the claim 12 portion of it was modified to correct the 35 U.S.C. § 112, second paragraph, antecedent basis issues noted by the Examiner.

This amendment should also be entered as reducing the issues on appeal.

Finally, for the reasons set forth below, it is submitted that the present amendment places the application in condition for allowance.

The Claims Distinguish Patentably Over the References of Record

Claim 4 calls for Cartesian coordinates within the common two-dimensional display frame to be assigned to non-Cartesian surface coordinates of the

curved surface. This finds antecedent basis in the present application, which describes converting the non-Cartesian coordinates θ and φ of the middle portion of Figure 1 into the Cartesian coordinates of the lower portion of Figure 1.

Paragraph [0052] of **Front** referenced by the Examiner is not concerned with transforming image display coordinates. Rather, Front discloses using a stereotactic frame 12 which includes a plurality of imageable markers 14 which are used for image alignment. Once Front has obtained the PET or SPECT image of Figure 2A which shows the target but no anatomical structure, and a CT image of Figure 2B which shows anatomical structure but not the target TG, the two images are combined in Figure 2C to produce a three-dimensional combined image which includes not only the anatomy and the target, but also the markers 14.

The clinician then attaches the stereotactic guide 18 to one of the attachments points 16 on the stereotactic frame 12 (see Front Figure 3; paragraph [0050]). A computer 24 controls the stereotactic guide 18 and displays the combined image (Front paragraph [0051]).

Paragraph [0052] of Front referenced by the Examiner indicates that the physician programs a trajectory into the computer 24. The computer 24 transforms the 3D Cartesian combined image into the coordinate system of the stereotactic guide 18. Note that there is no curved surface involved. Rather, it is customary that the 3D Cartesian coordinate combined image is rotated and translated (using an affine or rigid transform) such that one Cartesian coordinate axis is parallel to the trajectory of instrument 22 and two Cartesian coordinates are transverse to each other and to the trajectory axes. There are no non-Cartesian image coordinates. Rather, rotating and translating the Cartesian coordinates of a 3D combined image enables the physician to see the planned trajectory as a straight line in two orthogonal slices and to see the trajectory as a point (sometimes indicated as a cross-hair) in a transverse plane. By stepping through the transverse planes and conferring with the two orthogonal images in which the trajectory appears as a straight line, the clinician can determine exactly what tissue, organs, blood vessels, and the like, will intersect or miss. If the trajectory intersects inappropriate tissue, organs, or blood vessels, the physician adjusts the trajectory until a satisfactory trajectory is determined.

It should be noted that there is nothing in paragraph [0052] or other portions of Front concerning assigning Cartesian coordinates of a two-dimensional display plane to non-Cartesian surface coordinates of a curved surface. Paragraph [0052] of Front merely concerns the (rigid) transform which rotates the Cartesian coordinates of the combined image into alignment with the instrument 22. (Of course, rather than rotating the 3D image, one can rotate the addresses with which the 3D image is addressed such that one axis is along the instrument 22 and the other two are orthogonal to it).

Moreover, it is submitted that modifying Front in accordance with Etienne would render Front unsuited for its intended purpose. Specifically, **Etienne** warps the displayed 2D image such that "true" distances are not maintained (page 659, column 1, first paragraph, last sentence). Trying to plan a trajectory through displayed images when the displayed images are not true would render the planned trajectory unreliable in the sense that the biopsy needle or other instrument 22 is apt to intersect and pierce tissues, organs, or blood vessels which the clinician believed, from the warped planning image, would not be harmed.

Further, even if Etienne were combined with Front, Etienne similarly fails to show non-Cartesian coordinates or projections. Etienne projects from the volume V along the slice selection direction N, i.e., along Cartesian coordinates, onto the convex hull D'. This parallel maximum intensity projection, it is submitted, is performed in a Cartesian coordinate system. Similarly, the various views of Figure 3 are displayed in Cartesian coordinate systems. Thus, Etienne does not cure this shortcoming of Front.

Accordingly, it is submitted that **claim 4 and claims 7-9, 22, and 23 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 6 calls for the functional information to be obtained by evaluating a temporal sequence or from morphological image data of the anatomical object. The Examiner refers the applicant to paragraphs [0020] and [0023]-[0029]. Paragraph [0020] merely acknowledges that the stereotactic frame 20 is larger than the examination region of the imaging device, necessitating the acquisition of the entire structural image to be done section by section. Each section of the image is

only taken once. There is no multiple acquisition of the same structural data described, nor is there any description of evaluating a temporal sequence of morphological image data. Indeed, since each portion is only taken once, there is no data available for temporal evaluation.

Paragraphs [0022]-[0029] referenced by the Examiner are a restatement of claim 13. It is submitted that is not the scope of claim 13 which is significant, but rather the portions of the detailed description in which claim 13 finds antecedent basis that are significant. These paragraphs like paragraph [0020], merely indicate that the morphological image data of Front is acquired in spatial sections.

Moreover, for the reasons set forth above, it is submitted that there is no motivation to modify Front based on Etienne. Rather, distorting the images of Front such that they are not true images as taught by Etienne, it is submitted, would render Front unsuitable for its intended purpose.

Accordingly, it is submitted that **claim 6 and claim 21 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 13 calls for the projection of the anatomical features of interest onto a curved surface to be performed in non-Cartesian coordinates. Etienne projects the anatomical features parallel to the slice selection direction N. That is, the features are projected in parallel rays, which is to say in Cartesian coordinates. Front at paragraph [0052] calls for transforming the three-dimensional combined image from the coordinate system of the diagnostic scanner to the coordinate system of the stereotactic guide. More specifically, in order to maintain the accuracy of the three-dimensional image, it is submitted that the three-dimensional image is rigidly transformed, i.e., rotated and/or translated. First, this transform operation is not a projection. Second, the 3D combined image is in Cartesian coordinates before and after the rotation and/or translation. It is submitted that, as is conventional in the art, the 3D combined image is rotated such that one axis is parallel to the biopsy needle or instrument 22 and the other two axes are transverse to it and to each other. There is nothing in Front that suggests moving the Cartesian coordinate based 3D combined image from alignment with the coordinate system of the scanner which generated it into alignment with the coordinate system of the instrument 22, is either a projection in any coordinate system other than Cartesian.

Again it is submitted that there is no motivation or teaching to combine the Etienne technique into the stereotactic surgical technique of Front. Altering the images of Front such that they do not represent the true distances would defeat Front's intention of accurately determining a trajectory for the instrument 22.

Accordingly, it is submitted that **claim 13 and claims 14-20 dependent therefrom** distinguish patentably and unobviously over the references of record.

CONCLUSION

For the reasons set forth above, it is submitted that claims 4, 6-9, and 13-23 distinguish patentably and unobviously over the references of record and meet the other statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, the Examiner is requested to telephone Thomas Kocovsky at 216.363.9000.

Respectfully submitted,

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